

DOUGLAS-FIR DWARF MISTLETOE PARASITIZING PACIFIC SILVER FIR IN NORTHERN CALIFORNIA

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ABSTRACT.—Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) was found parasitizing Pacific silver fir (*Abies amabilis*) in northern Siskiyou County, California. This is the first report of Douglas-fir dwarf mistletoe on this host. Approximately 40% of the Pacific silver firs near heavily infected Douglas-firs were infected. The low level of infection on Pacific silver fir, unusually large swellings at the points of infection, and poor shoot production on infected branches indicate some degree of host-parasite incompatibility.

Douglas-fir dwarf mistletoe (*Arceuthobium douglasii* Engelm.) is a damaging parasite of Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) in the western United States (Graham 1961, Hawksworth and Wiens 1972). Douglas-fir dwarf mistletoe has been reported to occasionally or rarely parasitize true firs (*Abies* spp.), including grand fir (*Abies grandis* [Dougl.] Lindl.), corkbark fir (*A. lasiocarpa* var. *arizonica* [Merriam] Lemm.), subalpine fir (*A. lasiocarpa* var. *lasiocarpa* [Hook.] Nutt.), and white fir (*A. concolor* [Gord & Glend.] Lindl.) (Hawksworth and Wiens 1972, Mathiasen 1984, Mathiasen and Hawksworth 1983). This is the first report of Douglas-fir dwarf mistletoe on Pacific silver fir (*A. amabilis* [Dougl.] Forbes).

Pacific silver fir is a common tree in the Olympic and Cascade mountains of the Pacific Northwest. However, south of Crater Lake, Oregon, it occurs only in isolated populations in Siskiyou County, California (Griffin and Critchfield 1976). We discovered Douglas-fir dwarf mistletoe parasitizing Pacific silver fir in one of these populations, approximately 0.5 mile N of White Mountain (T18N, R3W, S31). The infestation of Douglas-fir dwarf mistletoe on Pacific silver fir was about five acres in size at an elevation between 1,580 and 1,700 m (5,200 and 5,600 ft).

The infected Pacific silver firs were in a stand primarily composed of Douglas-fir, white fir, Shasta red fir (*Abies magnifica* var. *shastensis* Lemm.), and western white pine (*Pinus monticola* Dougl.). Infected Pacific sil-

ver firs were in the vicinity of large Douglas-firs heavily infected with Douglas-fir dwarf mistletoe. Two other dwarf mistletoes were also present in the stand. Sugar pine dwarf mistletoe (*Arceuthobium californicum* Hawksw. & Wiens) was parasitizing western white pine, and red fir dwarf mistletoe (*A. abietinum* f. sp. *magnificae* Hawksw. & Wiens) was parasitizing Shasta red fir. Confirmation that the mistletoe on Pacific silver fir was Douglas-fir dwarf mistletoe was made by examination of the aerial shoots produced on infected Pacific silver firs. Although only a few shoots were found on infected Pacific silver fir branches, they could be identified as those of Douglas-fir dwarf mistletoe. The shoots of Douglas-fir mistletoe can be distinguished from those of sugar pine dwarf mistletoe and red fir dwarf mistletoe by their small size (Hawksworth and Wiens 1972). Specimens of Douglas-fir dwarf mistletoe on Pacific silver fir have been deposited at the U.S. Forest Service Forest Pathology Herbarium, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Hawksworth and Wiens (1972) devised a 5-class host susceptibility system based on the percentage of infection of potential hosts within 20 feet of heavily infected principal hosts of a dwarf mistletoe. Their system included the following susceptibility classes: Principal (90–100% infection), Secondary (50–89% infection), Occasional (5–49% infection), Rare (more than 0%, but less than 5% infection), and Immune (no infection). To as-

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certain the susceptibility class of Pacific silver fir to Douglas-fir dwarf mistletoe, we placed circular plots (radius 25 ft) around two large, heavily infected Douglas-firs. Trees within each plot were examined for dwarf mistletoe and the following data recorded for each tree: species, diameter breast height (nearest 2.0 in), and dwarf mistletoe rating (Hawksworth 1977). A total of 46 Pacific silver firs were examined in the two plots and 18 (39%) were infected. This level of infection indicates that Pacific silver fir should be classified as an occasional host for Douglas-fir dwarf mistletoe based on the susceptibility system of Hawksworth and Wiens. The 18 infected trees were distributed by infection class as follows: Class 1 (10), Class 2 (3), Class 3 (2), Class 4 (2), Class 5 (1). Most of the infected Pacific silver firs (72%) had light levels of infection (dwarf mistletoe ratings of 1 or 2). In addition, the presence of unusually large swellings at infection points and poor production of aerial shoots on infected branches indicate a somewhat incompatible host-parasite relationship between Pacific silver fir and Douglas-fir dwarf mistletoe (Hawksworth and Wiens 1972). Although Pacific silver fir is an occasional host of Douglas-fir dwarf mistletoe in northern California, this host-parasite com-

bination is probably not common because Douglas-fir dwarf mistletoe does not frequently occur within the geographic range of Pacific silver fir (Hawksworth and Wiens 1972).

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